

ASYMPTOTIC MERGING OF NODES SET FOR STOCHASTIC NETWORKS WITH NONHOMOGENEOUS INPUT

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When one investigate mathematical models of information-computing networks, data networks, and mobile communications, one of the main problems is connected with the large dimension of descriptive processes and complexity of the phase space of the stochastic model. To overcome such problems, the approach of asymptotic merging for nodes set of multichannel stochastic networks is proposed in the work.

For the first time the problem of asymptotic merging phase for complex stochastic systems was considered by V.S. Korolyuk. His works contain methodological aspects of this problem.

In our work we use the approach of asymptotic merging for investigation of multichannel stochastic networks as queueing networks operating in a heavy traffic regime. Input flows of calls are Poisson processes with their rates can be dependent on time. For such networks we consider a multidimensional service process that is a stochastic process indicating the number of calls at the nodes of the network at the instant of time.

Under heavy traffic conditions the service process of calls is studied for networks with generally distributed service times and two types of an input flow. For the service process of the merged network a limit Gaussian process is constructed. Due to the approach with merging, dimension of the limit process is reduced.